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A search for trachoma in Timor-Leste: no evidence to justify undertaking population-based prevalence surveys

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ABSTRACT

Purpose: We sought evidence to justify undertaking population-based trachoma surveys in Timor-Leste, believing that in the absence of such evidence, the country could be categorized as not needing interventions to eliminate trachoma.

Methods: We undertook a systematic review of published literature on trachoma in Timor-Leste, with results updated to 28 April 2018. We also undertook a series of clinic- and field-based screening exercises, consisting of: (1) in October 2015, conjunctival examination of all children attending a school in Vila, Atauro Island; (2) from 1 November 2016 to 30 April 2017, examination for trichiasis, by specifically-trained frontline eye workers, of all individuals presenting to the ophthalmic clinics of six referral hospitals and five district eye clinics; and (3) house-to-house case searches in a total of 110 households, drawn from three communities that were reported by investigators from the 2016 Rapid Assessment of Avoidable Blindness (RAAB) to include residents with trachoma.

Results: Three RAABs (2005, 2009–2010, 2016) and two relevant published papers were identified. The 2016 RAAB reported one female subject to have been diagnosed with trachomatous corneal opacity. Re-examination of that individual revealed that she had ankyloblepharon, without evidence of trichiasis or entropion. No children on Atauro Island, no clinic attendees, and no individuals examined in the targeted house-to-house searches had any sign of trachoma.

Conclusion: Trachoma is very unlikely to be a public health problem in Timor-Leste. It would not be appropriate to incur the costs of conducting formal population-based trachoma prevalence surveys here.

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Introduction

There is currently no commercially-available vaccine to prevent ocular *Chlamydia trachomatis* infection.^{1,2} Prevention of blindness from trachoma³ therefore relies on implementation of the SAFE strategy,⁴ which involves surgery for trachomatous trichiasis,⁵ antibiotics to clear *C. trachomatis* infection,⁶ and facial cleanliness⁷ and environmental improvement⁸ to reduce its transmission. Whether or not these things should be implemented as public health-level interventions for trachoma is determined by estimating the prevalence of key signs of disease:^{9,10} trachomatous inflammation—follicular (TF)¹¹ in 1–9-year-olds, and trachomatous trichiasis (TT)¹¹ in ≥ 15-year-olds. Undertaking population-based prevalence

surveys to generate such estimates requires resources,^{12,13} so deciding where to do so¹⁴ is an important programmatic step.

Trachoma is prevalent in a number of countries of Southern and South-East Asia, Australia and the Pacific Islands^{15–24} (though some aspects of the disease in the Pacific appear to be unusual.^{25–29}) Beyond the Western boundary of the Pacific Ocean, between Indonesia and Australia, lies Timor-Leste, which became a United Nations-recognized sovereign state in 2002. Its estimated 2015 population was 1.2 million people, distributed across the eastern half of the island of Timor, Oecusse (an exclave on Timor Island's northwestern side), and the island of Atauro. Dili, the national capital, is the

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largest city, with a 2015 population of 222,000. Atauro had a 2015 population of 9274 people, who are considered to have the lowest socioeconomic status in the country. Jaco, the other island included within Timor-Leste's territories (and the country's easternmost land mass) is uninhabited. The national human development index in 2017 was 0.625, which falls in the "medium" range.

Three factors prompted us to review the situation with respect to trachoma in Timor-Leste. First, the country is located close to other trachoma-endemic countries; trachoma clusters at various scales.^{30–33} Second, its population has relatively poor access to sanitation,³⁴ and poor access to sanitation is associated with increased risk of TF.³⁵ Third, there is a current drive to complete baseline trachoma mapping everywhere that it is justified,³⁶ as efforts ramp up to reach the target of global trachoma elimination.³⁷ We therefore looked for evidence to justify undertaking one or more population-based trachoma prevalence surveys here. We believed that failure to find such evidence after diligent search would mean that Timor-Leste could be categorized as "thought to not require interventions (to eliminate trachoma as a public health problem)" in the World Health Organization's Global Health Observatory (<http://apps.who.int/gho/data/node.main.A1645T>).

Methods

Investigations were undertaken from 2015 to 2017. We performed a systematic review plus various activities to screen individuals for trachoma.

For the systematic review, we searched the literature, employing three sources: (1) PubMed (<https://www.ncbi.nlm.nih.gov/pubmed/>), using the search terms ("trachoma*" OR "trichiasis") AND ("Timor" OR "Atauro" OR "Oecusse"); (2) the authors' own collections of published papers and grey literature, which are electronically indexed, using the same search terms; and (3) the online repository of rapid assessments of avoidable blindness (RAABs; <http://raabdata.info/repository/>), using the single search term "Timor". The literature search was done on 9 October 2016, and updated on 28 April 2018. Results were screened for relevance using articles' titles and abstracts; where we judged that a paper or report might contain trachoma prevalence data or case reports, we scrutinized the full document and extracted pertinent data. For the most recent RAAB, we were able to draw on the original dataset, which was accessible to our lead author (MC).

De novo trachoma screening consisted of three separate activities. For each of these, the World Health Organization simplified trachoma grading system¹¹ was generally used as the basis for diagnosis. Where

an ophthalmologist was involved, a more comprehensive clinical evaluation of the eyelid and cornea was also undertaken.

First, in October 2015, a visiting ophthalmologist (AJK) systematically examined all available children at a single school in Vila on Atauro Island (Figure 1), inspecting the everted upper eyelid of both eyes of each child, using a head-mounted 2.5 × magnifying loupe and bright illumination.

Second, all eyecare workers engaged by the East Timor Eye Program participated in a 1-day training program covering examination for and recognition of trichiasis, delivered by a senior registrar in ophthalmology (VA) in October 2016. Subsequently, from 1 November 2016 to 30 April 2017, those front-line personnel examined for trichiasis all patients seen as part of routine clinical care in the referral hospitals of Baucau, Maliana, Suai, Maubisse, Oecusse and Dili; and the eye clinics of Lospalos (Lautém District); Viqueque (Viqueque District), Same (Manufahi District), Ermera (Ermera District) and Atauro Island (Dili Municipality) (Figure 1).

Third, to follow up results from the 2016 RAAB, while undertaking outreach activities to screen for adult cataract, three specific communities in Baucau, Cova Lima and Liquiçá districts (Figure 1) were targeted for focused house-to-house searches for trachoma. Examinations were undertaken by ophthalmology registrars (VA, BMP) from the National Eye Centre. In the three villages, 50, 40 and 20 households, respectively, were visited. The eyelids of all consenting residents of selected households were examined.

Ethical considerations

Screening protocols were approved by the Human Research Ethics Committee, Ministry of Health, Timor-Leste (GEPS/EP/2014/021). Fieldwork was performed only after discussion with and verbal approval by relevant village chiefs, heads of local health clinics and the headmaster of the Atauro Island school. Verbal consent for examination was provided by each subject or, in the case of children, by a parent or guardian. Individuals diagnosed with any eye condition were offered full diagnostic workup and management, in accordance with the standard operating procedures of the East Timor Eye Program.

Results

Systematic review

The PubMed search returned 108 papers. Only one of these contained data on the prevalence of trachoma in

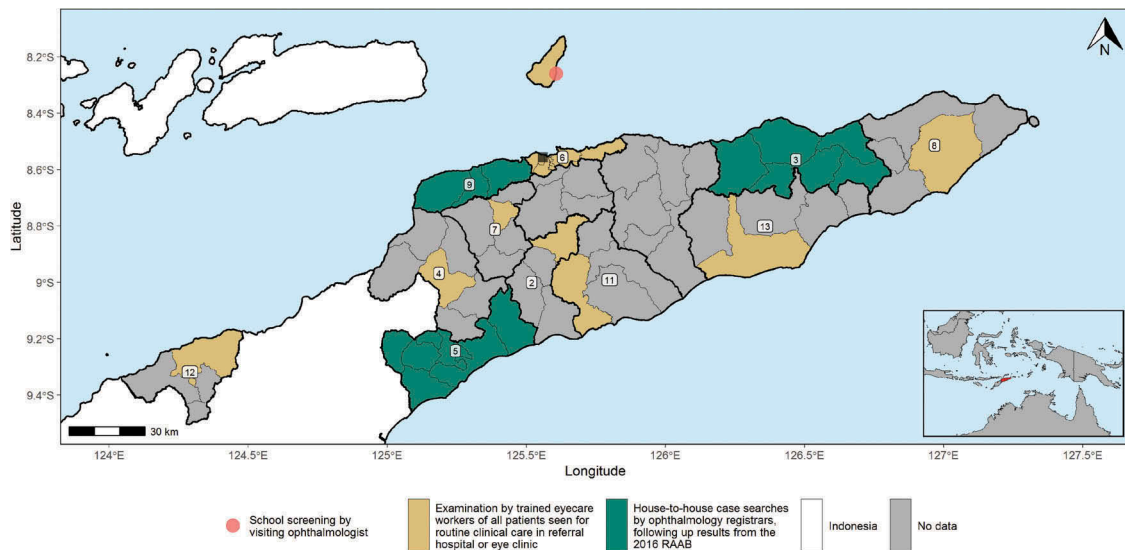


Figure 1. Spatial coverage of fieldwork conducted as part of this investigation: school screening by a visiting ophthalmologist; examination by trained eyecare workers of all patients seen for routine clinical care in referral hospital or eye clinic; and house-to-house case searches by ophthalmology registrars, following up results from the 2016 rapid assessment of avoidable blindness (RAAB). The black square shows the capital, Dili. District numbering: 2 = Ainaro (sub-district Maubisse); 3 = Baucau; 4 = Bobonaro (sub-district Maliana); 5 = Covalima; 6 = Dili; 7 = Ermera (sub-district Ermera); 8 = Lautém (sub-district Lospalos); 9 = Liquiça; 11 = Manufahi (sub-district Same); 12 = Oecussi (sub-district Pante Macassar).

Timor-Leste: a peer-reviewed publication³⁸ describing the methods and results of the 2016 RAAB. Most of this information was also included in the RAAB report³⁹ itself, and is therefore presented below.

In the authors' reference collections, one additional study of relevance was located, describing a 2012 study of 293 patients aged 17 years or older presenting to the National Eye Centre, 80% of whom were residents of Dili. No cases of TT or active (inflammatory) trachoma were diagnosed in that series.⁴⁰

In the RAAB online repository, three RAABs were listed for Timor-Leste, conducted in 2005,⁴¹ 2009–2010⁴² and 2016 (Figure 2).³⁹

In the 2005 RAAB, 50 villages were selected using a probability-proportional-to-village-population-size methodology, drawn equally from Dili and a single rural district, Bobonaro, 4.5 h by road from Dili. In each village, consecutive households were visited until 30 participants aged ≥ 40 years were enrolled. Presenting visual acuity was measured for each eye of each participant; any eye with

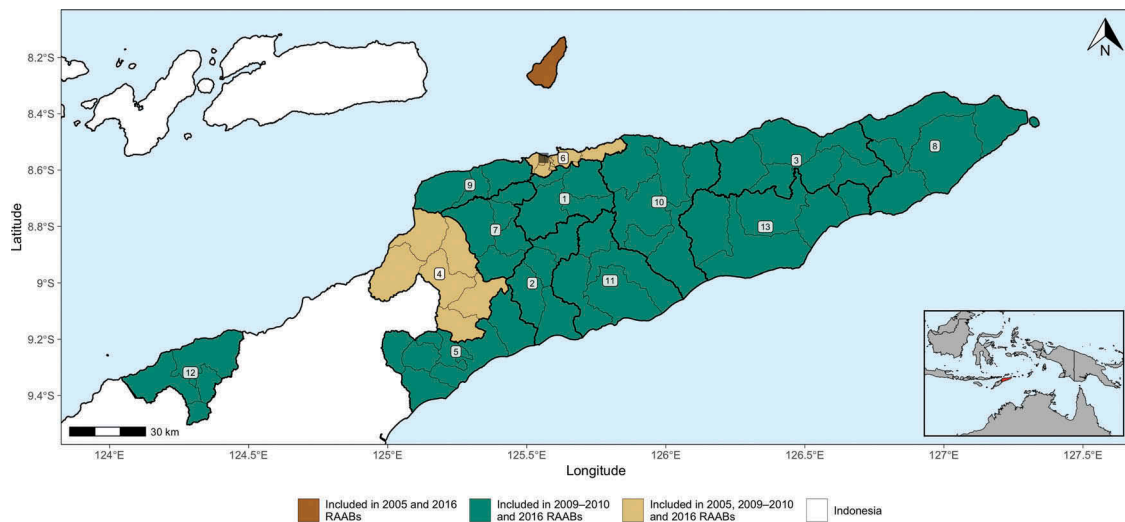


Figure 2. Spatial coverage of the three Timor-Leste rapid assessments of avoidable blindness (RAABs) identified, which were conducted in 2005, 2009–2010 and 2016. The black square shows the capital, Dili. District numbering: 1 = Aileu; 2 = Ainaro; 3 = Baucau; 4 = Bobonaro; 5 = Covalima; 6 = Dili; 7 = Ermera; 8 = Lautém; 9 = Liquiça; 10 = Manatuto; 11 = Manufahi; 12 = Oecussi; 13 = Viqueque.

visual acuity worse than 6/18 was further examined to ascertain the cause of reduced vision. Amongst 1414 people examined, no cases of trichomatous blindness or low vision were identified.⁴¹

In the 2009–2010 RAAB, from a list of all villages in the country's 12 mainland districts, 50 villages were selected with probability proportional to village population size. Some 87% of the population eligible for selection was rural. In each selected village, consecutive households were enrolled until 45 participants aged ≥ 40 years were enrolled; in all, 2014 people were examined. The examination protocol was the same as that used in 2005. No eyes with trichomatous blindness or low vision were found.⁴²

In the 2016 RAAB, all 13 districts of Timor-Leste were included, and 67 villages were selected with probability proportional to population size.³⁹ Trained teams examined a total of 3253 participants aged ≥ 50 years.³⁸ Four individuals, in Baucau, Cova Lima, and Liquiçá districts, were reported to have trachoma, including one female subject reported to have bilateral trichomatous corneal opacity.³⁸ (During subsequent outreach work, this individual was identified, re-examined and found to have ankyloblepharon, without evidence of trichiasis or entropion.)

De novo trachoma screening

In October 2015, on Atauro, 58 children aged 9–17 years (mean 11 years) were examined. One 13-year-old male had unilateral conjunctival scarring of the right upper lid that had an appearance that would be atypical of trichomatous scarring. There were no corneal changes, and no eyelashes touched the eye. The eyelids of the other 57 children had no signs consistent with trachoma.

Fourteen eyecare workers were trained to recognize trichiasis and asked to do so as part of their day-to-day clinical work. The screening protocol required staff to call the National Eye Centre in Dili if any suspected cases were identified, whereupon one of the visiting Ophthalmology Fellows would be tasked with driving out to visit patients in their homes, in order to verify the diagnosis. No calls were received in the designated 6-month screening period. To ensure that this was not due to front-line eyecare personnel forgetting the screening exercise or being unable to report cases because of pressure of other work, Fellows and the Head of Department of the National Eye Centre periodically called eyecare workers to remind them; on each occasion, assurance was received that trachoma was being searched for, and that no suspected cases had been identified.

In three villages of Baucau, Cova Lima and Liquiçá in which trachoma was reported to have been identified

in the 2016 RAAB, no cases of trichiasis, trichomatous conjunctival scarring or active trachoma were found.

Discussion

Though much work remains, tremendous progress is currently being made against trachoma globally.^{43,44} We undertook the studies described in this manuscript because it was not clear whether trachoma was likely to be a public health problem in Timor-Leste, and we did not want its people to be left behind. We used an approach consistent with the logic used for justifying mapping or not mapping within the Global Trachoma Mapping Project.¹⁴ Documenting the methodology and outcome of our work is, we think, important, to avoid duplication of effort and, assuming that others agree with our conclusion, to prevent continuing uncertainty over the possibility of a trachoma elimination program being required here.

With a predominantly rural population—almost two thirds of residents live in areas considered to be remote—and an under-resourced health service, there are multiple barriers to accessing eye care in Timor-Leste.^{45,46} We could not necessarily assume that individuals suffering from trichiasis would present to clinics requesting assistance for that problem. We therefore systematically searched for evidence of trichiasis in the published literature on Timor-Leste, in individuals attending eye care facilities with any presenting complaint, and in samples drawn from communities believed (on the basis of previous reports) to be at high risk.

In the three RAABs that we identified^{38,41,42} investigators assessed the anterior segment of an examinee's eye, including for corneal opacity, only if the eye had low vision: the presence of trichiasis in an eye with normal presenting vision would not have been recorded. The previously-published study conducted at the National Eye Centre⁴⁰ entailed a comprehensive ophthalmic examination of each patient by an eye specialist, but only 57 of 293 subjects included were residents of rural areas, where trachoma is more likely to be found.^{33,47,48} Our systematic clinic-based screening exercise provided far greater geographical coverage. We visited the culturally-distinct, former prison island of Atauro, where water, sanitation, and other infrastructure are below average national standards, to look for trachoma in the conjunctivae of local school-children. Prompted by reports of trichiasis being found in individuals sampled within the 2016 RAAB, we also undertook active screening of residents of all ages in three purposively-selected rural communities. We found no evidence of trachoma in any individual examined.

These investigations had some weaknesses. First, RAABs do not involve the examination of children and do not

include eyelid eversion, even if vision is $< 6/18$ in the better eye. They therefore have poor sensitivity for determining whether trachoma is present as a public health problem. Second, the de novo screening that we undertook was somewhat limited in scope, concentrating particularly on individuals self-presenting to eye care services, with the only fieldwork undertaken being the visit to Atauro and a follow-up of three communities identified by the 2016 RAAB as possibly having residents with trichiasis. All children examined on Atauro in October 2015 were aged 9 years or above; active trachoma is much more usually found in pre-school-age than older children,^{49–51} but in areas of intense transmission, conjunctival scarring can be seen in 9–17-year-olds, as examined here.⁵² Unfortunately, we did not have the human resource capacity to also undertake community-based screening of younger children during the visit to Atauro. Third, no formal standardization (through inter-grader agreement exercises or objective structured clinical examination^{53–55}) of the graders who participated in our trachoma screening exercises was undertaken. Fourth, house-to-house surveys, as used in three communities in this series of investigations, will result in under-representation of working adults and school-going children. The latter are, however, less likely to have trachoma than 1–9-year-olds examined as part of community-based surveys.⁵⁶ Finally, some authorities advocate the use of the key informant method⁵⁷ as the best method for identifying blinding eye conditions; we did not use this technique.

Despite these limitations, having failed to find a single case of trichiasis amongst all-comers to eye care services nation-wide over a continuous period of observation of 6 months, and having been unable to substantiate previous case reports of trachoma or find others with evidence of disease in the same communities, we suggest that trachoma is very unlikely to represent a current public health problem in Timor-Leste. Given that only 41% of the population accesses improved sanitation facilities,³⁴ continued vigilance for the emergence of trachoma will be necessary until such time as living standards improve.

Disclosure Statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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